

MODEL QUESTION PAPER-1

For Reduced Syllabus 2020-21

MATHEMATICS : FIRST PUC

Subject code: 35

Time: 3 hours 15 minute

Max. Marks: 100

Instructions:

- The question paper has five parts namely A, B, C, D and E. Answer all the parts.
- Use the graph sheet for the question on linear programming in **PART – E**.

PART-A

I. Answer all the following questions:

10×1=10

- Write the set $\{x : x \in R, -4 < x \leq 6\}$ as an interval.
- If $P = \{a, b, c\}$ and $Q = \{r\}$, form the set $P \times Q$.
- Convert 300° into radian measure.
- Find the multiplicative inverse of the complex number $1+i$.
- Solve: $5x-3 < 7$, when x is an integer.
- If ${}^n C_8 = {}^n C_2$, find the value of n .
- Find the geometric mean of the numbers 2 and 8.
- Find the slope of the line passing through the points $(3, -2)$ and $(7, -2)$.
- Evaluate: $\lim_{x \rightarrow \frac{\pi}{4}} \sin 2x$.
- Define sample space of a random experiment.

PART-B

II. Answer any TEN of the following questions:

10×2=20

- Write the power set of the set $A = \{1, 2, 3\}$.
- Let $A = \{a, b\}$ and $B = \{a, b, c\}$. Is $A \subset B$? What is $A \cup B$?
- If $\left(\frac{x}{3} + 1, y - \frac{2}{3}\right) = \left(\frac{5}{3}, \frac{1}{3}\right)$, find the values of x and y .
- A wheel makes 360 revolutions in one minute. Through how many radians it turns in one second.
- Prove that $\sin^2 \frac{\pi}{6} + \cos^2 \frac{\pi}{3} - \tan^2 \frac{\pi}{4} = -\frac{1}{2}$.
- Express the complex number $(3 + 5i)(2 + 6i)$ in the form $a + ib$.
- Solve: $7x + 3 \leq 5x + 9$. Show the graph of the solution on the number line.
- In how many ways can the letters of the word PERMUTATIONS be arranged if the

vowels are all together.

19. Find the distance between the lines $3x-4y+7=0$ and $3x-4y+5=0$.
20. Find the equation of the line perpendicular to the line $x-2y+3=0$ and passing through the point $(1,-2)$.
21. If $(1,1)$ is the centroid of the triangle with $(3,-5,7)$ and $(-1,7,-6)$ as the two vertices, find the third vertex.
22. Evaluate: $\lim_{x \rightarrow 2} \frac{\frac{1}{x} + \frac{1}{2}}{x+2}$.
23. The mean of the six observations 5, 15, 25, 35, 45, 55 is 30, find its variance.
24. A coin is tossed twice, what is the probability that atleast one tail occurs?

PART-C

III. Answer any TEN of the following questions:

10×3=30

25. In a class of 35 students, 24 likes to play cricket and 16 likes to play football, also each student likes to play at least one of the games. How many students like to play both cricket and football?
26. Let $A = \{1, 2, 3, \dots, 14\}$. Define a relation R from A to A by $R = \{(x, y) : 3x - y = 0 \text{ and } x, y \in A\}$. Write down its domain and range.
27. Prove that $\cos\left(\frac{3\pi}{4} + x\right) + \cos\left(\frac{3\pi}{4} - x\right) = -\sqrt{2} \sin x$.
28. Find the conjugate of $\frac{(3-2i)(2+3i)}{(1+2i)(2-i)}$.
29. Solve the equation $3x^2 - 4x + \frac{20}{3} = 0$.
30. Find all pairs of consecutive even positive integers, both of which are larger than 5 such that their sum is less than 23.
31. If ${}^n P_5 = 42 {}^n P_3$, $n > 4$. Find n .
32. How many terms of the A.P. $-6, -\frac{11}{2}, -5, \dots$ are needed to give the sum -25?
33. In an A.P., if m^{th} term is n and the n^{th} term is m , where $m \neq n$, find the p^{th} term.
34. Evaluate: $\lim_{x \rightarrow 2} \frac{3x^2 - x - 10}{x^2 - 4}$.
35. Find the derivative of $y = x^4(5 \sin x - 3 \cos x)$.
36. Find the mean deviation about median for the following data:
3, 9, 5, 3, 12, 10, 18, 4, 7, 19, 21.

37. A fair coin with 1 marked on one face and 6 on the other and a fair die are both tossed. Find the probability that the sum of numbers that turn up is (i) 3 (ii) 12.
38. A and B are events such that $P(A)=0.42, P(B)=0.48$ and $P(A \text{ and } B)=0.16$. Determine i) $P(\text{not } A)$ ii) $P(\text{not } B)$ and iii) $P(A \text{ or } B)$.

PART-D

IV. Answer any SIX of the following questions:

6×5=30

39. Define Modulus function. Draw the graph of Modulus function and write its domain and range.
40. Prove that $\frac{\sin 7x + \sin 5x + \sin 9x + \sin 3x}{\cos 7x + \cos 5x + \cos 9x + \cos 3x} = \tan 6x$.
41. Find $\cos \frac{x}{2}$ and $\tan \frac{x}{2}$, if $\tan x = \frac{3}{4}$, $\pi < x < \frac{3\pi}{2}$.
42. Solve the following system of inequalities graphically:
 $3x + 2y \leq 150, x + 4y \leq 80, x \leq 15, x \geq 0, y \geq 0$.
43. A committee of 7 is to be formed from 9 boys and 4 girls. In how many ways can this be done when the committee consists of (i) exactly 3 girls? (ii) at least 3 girls?
44. Find the equation of the line through the point (2,2) and cutting off the intercepts on the axes whose sum is 9.
45. Derive a formula to find the perpendicular distance of a point $P(x_1, y_1)$ from the line $Ax + By + C = 0$.
46. Derive a formula for finding the distance between two points $A(x_1, y_1, z_1)$ and $B(x_2, y_2, z_2)$ and hence, find the distance between the points $P(2,3,1)$ and $Q(-1,3,-5)$.
47. Find the derivative of $\tan x$ from first principles.
48. Find the mean deviation about the mean for the following data:

Height in cm	95 -105	105-115	115-125	125-135	135-145	145-155
Number of boys	9	13	26	30	12	10

PART-E

V. Answer any ONE of the following questions:

1×10=10

49. a) Prove geometrically that $\cos(x+y) = \cos x \cos y - \sin x \sin y$ and hence find $\cos\left(\frac{\pi}{2} + x\right)$.
- b) Differentiate $\frac{x + \cos x}{\tan x}$ with respect to x .
50. a) Prove that $\lim_{x \rightarrow 0} \frac{\sin x}{x} = 1$, (where x is in radian measure) and hence evaluate $\lim_{x \rightarrow 0} \frac{\sin ax}{bx}$.
- b) Find a geometric progression for which the sum of the first two terms is -4 and the fifth term is 4 times the third term.